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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/511,865	03/10/2005	Robert E. Lo	23095	6670

535 7590 03/30/2007  
THE FIRM OF KARL F ROSS  
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EXAMINER
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MCDONOUGH, JAMES E

ART UNIT	PAPER NUMBER
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1755

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/30/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/511,865	<b>Applicant(s)</b> LO ET AL.	
	<b>Examiner</b> James E. McDonough	<b>Art Unit</b> 1755	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 05 March 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 17-42 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 17-42 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### **Original Rejection**

Claims 17, 19-27, 30-31, 33, and 35-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reynolds (US Patent No. 3,259,532) in view of Grosse et al. (US Patent No. 3,137,127).

Reynolds teaches the use of a carbonaceous substance dispersed in liquid oxygen. This mixture is then incorporated into the interstices of a metal sponge that inherently has hollow spaces of a size that would affect the combustion speed (preferably aluminum or magnesium) (column 1, line 44 to column 2, line 5).

Although, Reynolds does not explicitly disclose the freezing of the liquid oxygen to form a solid monergole propellant, Reynolds does disclose that the liquid oxygen suspension can be incorporated into the interstices by either directly pouring of the suspension onto the sponge or by immersing the sponge in the suspension (column 2, line 34 to column 2, line 49). However, because Grosse et al. disclose the use of a fuel/oxidizer or both that are normally gaseous or liquid at room temperature being frozen solid for use as a rocket motor (column 1, line 14 to column 1, line 47) giving the advantage of having a high specific impulse as normal for liquid fuel engines without the typical drawbacks such as extra plumbing, valves, and separate containers for the fuel and oxidizer associated with liquid fuel rocket engines (column 1, line 48 to column 2, line 6), It is prima facie obvious to combine two or three compositions, each taught for the same purpose to yield a third composition for that very purpose. In re Kerkhoven, 205 USPQ 1069, In re Pinten, 173 USPQ 801, and In re Susi, 169 USPQ 423.

Also, it would have been obvious to someone of ordinary skill in the art at the time of the invention to change the size of the hollow spaces in the sponge, thereby affecting the rate of combustion by changing the surface area, since the reaction kinetics of solid reactants are primarily controlled by the available surface area of said reactants. As to limitations which are considered to be inherent in a reference, note the case law of *In re Ludke*, 169 USPQ 563; *In re Swinehart*, 169 USPQ 226, *In re Fitzgerald*, 205 USPQ 594; *In re Best et al*, 195 USPQ 430; and *In re Brown*, 173 USPQ 685,688.

Claims 28-29, 34, and 40-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reynolds (US Patent No. 3,259,532) in view of Grosse et al. (US Patent No. 3,137,127) in further view of Stickler (US Patent No. 5,529,648).

Although, neither Reynolds nor Grosse et al. explicitly disclose the use of an initially encapsulated liquid that is then bonded with the solid structure then frozen. However, because Stickler teaches the use of a dispersion of encapsulated liquid within a solid fuel matrix (column 3, line 60 to column 4, line 5) and Grosse et al. disclose the use of a fuel/oxidizer or both that are normally gaseous or liquid at room temperature being frozen solid together for use as a rocket motor (column 1, line 14 to column 1, line 47), it is prima facie obvious to combine two or three compositions, each taught for the same purpose to yield a third composition for that very purpose. *In re Kerkhoven*, 205 USPQ 1069, *In re Pinten*, 173 USPQ 801, and *In re Susi*, 169 USPQ 423.

Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Reynolds (US Patent No. 3,259,532) in view of Grosse et al. (US Patent No. 3,137,127) in further view of Keilbach et al. (US Patent No. 3,691,769).

Although, neither Reynolds nor Grosse et al. explicitly disclose the use of a protective coating on the solid phase to chemically insulate the two reactants from one another. However because Keilbach et al. disclose that metals when mixed with an oxidizer in a rocket engine need to be protected from oxidation (column 4, line 16 to column 4, line 33), it is prima facie obvious to combine two or three compositions, each taught for the same purpose to yield a third composition for that very purpose. In re Kerkhoven, 205 USPQ 1069, In re Pinten, 173 USPQ 801, and In re Susi, i69 USPQ 423.

### **Response to arguments**

Applicants argue that in spite of the state of the art, that the skilled person in the art has a number of technical problems to increase the efficiency of cryogenic solid propellants, and go on to list some problems. These arguments are fully considered and found to be not persuasive, because applicant's claims do not address these problems. Furthermore, if the references are using similar compositions and similar methods one would expect similar results absent any evidence to the contrary.

Applicants argue that upon freezing the liquid oxygen from the references, it will contract in volume, producing shrink holes. However, this argument is found to be not

persuasive because, the liquid oxygen used in the instant application will also contract and, applicants offer no recitation in their claims on how they get around this.

Applicants argue that an expert would not use solidified oxygen or hydrogen peroxide. This is found to be not persuasive because, both cited references and the instant application call for solidified oxygen and hydrogen peroxide.

Applicants argue that their inventive step in comparison with Reynolds is created by the fact that the volume decrease at the solidification of the liquid oxygen does not lead to shrink holes in the pores of the sponge. This found to be not persuasive because, applicants do not point out any differences between the reference and the instant application that allow their oxygen to contract and not form bubble/shrink holes, where the reference would.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicants do not argue the combination of references, only that each reference by itself does not teach the limitations of the claims.

Applicants argue that they do not use a liquid dispersion. This argument is found to be not persuasive because, clearly in old claim 1 and new claim 19 applicants teach using a suspension of solid components in liquid components, which is the same as a liquid dispersion.

Applicants argue the propellants according to Kielbach are liquid slurries such as... liquid oxygen and liquid hydrogen. No cryogenic propellants are shown in Kielbach. This is found to be not persuasive because, Liquid oxygen/hydrogen are the quintessential cryogenic rocket propellants (i.e. the main engine on the space shuttle). The boiling point of Hydrogen is  $-252.8^{\circ}\text{C}$  and that of Oxygen is  $-183.17^{\circ}\text{C}$ , since dry ice sublimates at  $-78.4^{\circ}\text{C}$  and liquid nitrogen boils at  $-195.86^{\circ}\text{C}$  and the fact that these are the most common cryogens. It appears that applicants do not understand the meaning of the word cryogen/cryogenic.

Applicants argue that their application when compared to the state of the art is new as well as inventive. This is found to be not persuasive because, the references clearly teach or anticipate the instant claims and applicants have not pointed out any real difference between that of the instant application and that of the references.

### **New Rejection**

Claims 18 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reynolds (US Patent No. 3,259,532) in view of Grosse et al. (US Patent No. 3,137,127) in further view of Krivohlavek (USP 5,834,539).

Although, neither Reynolds or Grosse et al. teach the use of an emulsion of liquids that are not soluble together, Reynolds and Grosse et al. teach the rest of the limitations of the claims. However, because Kreivohlavek teaches that energetic materials comprising emulsions burn, combust, or explode with greater efficiency

Art Unit: 1755

(column 1, lines 34-38), it would have been obvious to someone of ordinary skill in the art at the time the invention was made to combine the teachings of these three references with a reasonable expectation of success and the expected benefit of producing a more efficient rocket propellant.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James E. McDonough whose telephone number is (571)272-6398. The examiner can normally be reached on 8:30am-5:00pm.



If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jerry Lorengo can be reached on (571)272-1233. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JEM 3/27/2007

  
AILEEN FELTON  
PRIMARY EXAMINER